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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/637,108	08/08/2003	Gurtej S. Sandhu	3264.6US (92-0280.09/US)	5025
24247	7590	05/28/2004		
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110				
EXAMINER LEBENTRITT, MICHAEL				
ART UNIT		PAPER NUMBER		
2824				

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Applicati n No.

10/637,108

Applicant(s)

SANDHU ET AL.

Examiner

Michael S. Lebentritt

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-- The MAILING DATE of this communication appears n the cover sheet with the corresp ndence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

**DETAILED ACTION*****Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6,632,736. Although the conflicting claims are not identical, they are not patentably distinct from each other because similar subject matter is claimed:

providing a silicon region on a surface of a semiconductor wafer for making electrical contact thereto; depositing a dielectric layer over at least a portion of the silicon region; etching a contact opening through the dielectric layer for exposing a portion of the silicon region, the contact opening having a side wall; depositing a titanium metal layer within the contact opening for covering the portion of the silicon region exposed by the contact opening; depositing a predominantly amorphous titanium carbonitride film having (predominantly no definite crystalline structure and) having (substantially) predominantly no crystalline titanium therein, the predominantly (substantially) amorphous titanium carbonitride film for lining the side wall of the contact opening to overlay the titanium metal layer covering the portion of the silicon region exposed by the contact opening; and filling at least a portion of the contact opening using a conductive material.

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2. The process of claim 1, wherein depositing the predominantly amorphous titanium carbonitride film comprises a chemical vapor deposition process.

3. The process of claim 2, wherein the chemical vapor deposition process includes: evacuating a deposition chamber to a pressure of less than about 100 torr; heating the semiconductor wafer to a temperature within a range of about 200.degree. C. to about 600.degree. C.; maintaining the temperature of the semiconductor wafer within the range of about 200.degree. C. to about 600.degree. C.; admitting an organometallic precursor compound into the deposition chamber, the organometallic precursor compound including a tetrakis-dialkylamido-titanium compound; decomposing the organometallic precursor compound at least near the surface of the semiconductor wafer; and depositing the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium therein on at least a portion of the surface of the semiconductor wafer and within at least a portion of the contact opening.

4. The process of claim 3, wherein the organometallic precursor compound comprises tetrakis-dimethylamido-titanium.

5. The process of claim 1, wherein the conductive material comprises a metal selected from the group consisting of tungsten, aluminum, copper and nickel.

6. The process of claim 1, wherein the conductive material comprises doped polycrystalline silicon.

7. The process of claim 1, further comprising: heating the semiconductor wafer; and reacting at least a portion of the titanium metal layer covering the portion of the silicon region exposed by the contact opening with the silicon region to form a titanium silicide layer.

8. The process of claim 7, wherein the reacting the at least a portion of the titanium metal layer with the silicon region occurs prior to depositing the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium nitride therein.

9. The process of claim 7, wherein the reacting the at least a portion of the titanium metal layer with the silicon region occurs subsequent to depositing the predominantly amorphous

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titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium nitride therein.

10. The process of claim 1, further comprising: subjecting the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium therein to rapid thermal processing in the presence of one or more gases selected from the group consisting of nitrogen, hydrogen and the noble gases.

'736 fails to claim wherein in the depositing of the amorphous titanium carbonitride film is by vapor deposition in a chamber. It is well known in the art to deposit amorphous titanium carbonitride film by vapor depositing in a chamber.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Lebentritt whose telephone number is 571-272-1873. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael S. Lebentritt  
Primary Examiner  
Art Unit 2824